



Students in the top two sets will study this additional qualification, parallel to their GCSE Mathematics. Edexcel Level 2 Extended Mathematics Certificate fills the gap for high achieving students by assessing their higher order mathematical skills, particularly in algebraic reasoning, thus preparing them fully to maximise their potential in further studies. It offers the opportunity for stretch and challenge that builds on the Key Stage 4 curriculum and is intended as an additional qualification to the GCSE Mathematics, rather than as a replacement. Emphasis is placed on higher order technical proficiency, rigorous argument and problem solving skills. It is designed for those who are expected to achieve, grades 7, 8 and 9 in GCSE mathematics and are likely to progress to A-Level study in Mathematics and possibly Further Mathematics.

Year Group: Year 10 Extended Mathematics Certificate

This is the plan for the taught curriculum during achievement period: Jan-July

#### **Brief summary of the topic/work being covered during this period**

1. Apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results.
2. Enumerate sets and combinations of sets systematically, using tables, grids, Venn diagrams and tree diagrams
3. Calculate the probability of independent and dependent events, including using tree diagrams and other representations, and know the underlying assumptions
4. Calculate and interpret conditional probabilities through representation using expected frequencies with two way tables, tree diagrams and Venn diagrams
5. Know the formula for Pythagoras' theorem and the trigonometric ratios; apply them to find angles and lengths in right-angled triangles and in 2D and 3D figures
6. Know and prove using triangles the exact trig values for 0, 30, 45, 60 and 90 degrees

#### **Prior knowledge needed for this unit/topic from previous teaching**

1. Know all circle theorems required for GCSE and identify when a circle theorem can be used to help solve a geometrical problem
2. Use a combination of known and derived facts to solve a geometrical problem and justify solutions to geometrical problems
3. Write probabilities as decimals, percentages or fractions, understand and use experimental and theoretical measures of probability
4. Understand selection with or without replacement and calculate the probability of independent and dependent events
5. Use two-way tables, tree diagrams and Venn diagrams to calculate conditional probability
6. Know and apply Pythagoras' Theorem
7. Apply the trigonometric ratios to find angles and lengths in general triangles in 2D figures
8. Know the exact values of  $\sin \vartheta$  and  $\cos \vartheta$  for  $\vartheta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$  and  $90^\circ$ ; know the exact value of  $\tan \vartheta$  for  $\vartheta = 0^\circ, 30^\circ, 45^\circ$  and  $60^\circ$ .

#### **Rationale for students studying this unit/topic**

##### **Rationale for studying:**

Students will:

1. Develop knowledge, skills and understanding of higher order mathematical methods and concepts
2. Acquire and use problem solving strategies including the use of algebra as a tool for solving problems
3. Select, apply and link mathematical techniques and methods to solve challenging and non-routine problems
4. Reason mathematically, make deductions and inferences and draw conclusions
5. Interpret and communicate mathematical information in a variety of forms appropriate to the information and context including rigorous use of algebraic argument and formal proof.

##### **Rationale for timing:**

1. The trigonometric ratios for right-angled triangles introduced here, are then developed next year to non-right angled triangles and more complex 2D shapes
2. Towards the end of year 10, students have much more experience of the Key Stage 4 style of questioning and assessment, and are therefore academically mature enough to tackle the more challenging topics.

#### **Key concepts/ideas that are taught to students in this unit/topic, including any anticipated gaps in knowledge and plan to overcome these**

1. Answers may be displayed on a calculator in surd form.
2. Students forget to square root their final answer, or round their answer prematurely.
3. Probability without replacement is best illustrated visually and by initially working out probability 'with' replacement.
4. Not using fractions or decimals when working with probability trees.

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**New key terminology students will be taught during this topic/unit**

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Chord, cyclic quadrilateral, alternate, segment, semicircle, arc, theorem. Mutually exclusive, conditional, tree diagrams, sample space, outcomes, theoretical, relative frequency, Venn diagram, fairness, experimental

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**Plan for Assessment**

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- Informal assessment is ongoing through class work, contributions to class discussion and teacher assessment during lessons.
- Teacher's record homework marks for GCSE each week on a centrally held department tracker; the homework tasks are detailed on the schemes of work and outlined centrally within the department to ensure consistency across all classes. Teachers will take in and formally mark a written piece of homework once every two weeks. Students will then have time during a subsequent lesson to review their work and make any corrections
- Formal assessment will take place for Edexcel Extended Certificate during this achievement period. The necessary skills are covered in a synoptic paper that aims to assess students' progress in mathematics generally and covers questions from all topics that have been covered at any point in the students' mathematical history (not just this academic year).
- Mini start-of-topic tests will provide information for teachers regarding prior knowledge and existing misconceptions and mini end-of-topic tests will help students and teachers see the progress that has been made over the course of the teaching of the topic.